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THE AMERICAN ASSOCIATION.

The forty-fifth meeting of the American Association for the Advancement of Science was held in Buffalo beginning with the meeting of the Council on Saturday, August 22d. The general sessions opened on Monday and the meeting continued throughout the week until Saturday, which was given to excursions. It is worthy of note that this was the fourth meeting held in Buffalo, the Association having met there every tenth year since 1866.

At the first general session the retiring President, Professor Edward W. Morley, called the meeting to order and introduced the President-elect, Professor Edward D. Cope. Bishop Charles H. Fowler, D.D., pronounced the invocation. The Hon. Edgar B. Jewett, Mayor of Buffalo, delivered the address of welcome from the city, and Professor Cope responded. In the afternoon eight vice-presidents delivered addresses before their respective sections; and in the evening the retiring President gave a learned address before the Association on the subject, "A Completed Chapter in the History of the Atomic Theory."

Vice-President B. K. Emerson, of Amherst, Mass., chose for the subject of his address before the Section of Geology and Geography, "Geologic Myths." He announced that he would speak of "The Chimaera, or the poetry of petroleum; of the Niobe, or the tragic side of calcareous tufa; of Lot's wife, or the indirect effect of cliff erosion; and of Noah's flood, or the possibilities of the cyclone and the earthquake wave working in harmony."

The myth of the Chimaera, he said, was told in its earliest form by Hesiod, who lived about nine centuries before the Christian era; and a little later by Homer. In each of these verses, which he quoted, the Chimaera is represented as a huge monster having the head of a goat, the body of a lion and the tail of a serpent, from whose mouth and nostrils issue flames of fire. Tracing the origin and development of this myth, Professor Emerson showed that it was derived from the remarkable geological phenomenon of natural gas burning on the peak of a mountain of serpentine and limestone in Lycia. This burning mountain was seen by Admiral Beaufort while off the coast of Lycia toward the end of the seventeenth century; and according to tradition it has burned there for nearly 3,000 years. "Ruins of an ancient temple of Vulcan near by and a little Byzantine church show how strongly it has impressed the inhabit-

ants in all ages." The Phœnician word Chimaera means burning mountain; the Greek word for goat has nearly the same sound; and in this way came about the myth of "a goatlike form vomiting flames and ravishing in the mountains of woody Lycia."

In tracing the myth of Niobe, the Professor said, "As one climbs from the Gulf of Smyrna, between Mount Tmolus and Sipylus, . . . high up in the vertical limestone, there appears the colossal bust of a woman standing on a high pedestal and in a deep alcove. It is cut out of the living rock, like the Swiss lion at Lucern." This is the "almost prehistoric" statue of the great Mother Cybele or the Mētēr Sipylene—gods of the Phœnicians—and is the origin of the Niobe myth. The dripping of the water from the limestone roof of the alcove has caused the "stalagmite tears" and the masses of rock dislodged from the cliffs around her by the action of the sun and rain are her children, slain by the arrows of Phœbus. From this geological phenomenon acting on the ancient stone sculpture the poetic mind of the Greek created the myth of Niobe weeping for her children.

The column of salt, known as Lot's Wife, is still standing in the Dead Sea. It owes its origin to geological changes in that region; and it owes its continuation to the action of the erosion. The name is supposed to be derived from some old word having the sound of Lot's wife.

The Professor gave an erudite history of the Flood myth, tracing it through all times and countries, and showing its remote antiquity by the statement that in the annals of the Babylonians, which can now be traced back 3800 B. C., no certain account of a flood has yet been found. In demonstrating that all these flood myths arise from natural geological phenomena, he recalled various similar catastrophes in modern times, such as the last terrible earthquake waves in China and Japan.

Miss Alice C. Fletcher of Washington, D. C., Vice-President of the Section of Anthropology, spoke on "Emblematic use of the Tree in the Dakotan Group." The tribes of the Dakotan or Siouan linguistic stock aggregate in number about 45,000 Indians. Certain tribes of this stock, at the beginning of the seventeenth century, occupied a strip of land along the Atlantic Coast, now within the limits of North and South Carolina, and were gradually driven west by their warlike neighbors, the Algonquins and Iroquois, becoming extinct as tribes within the historic period. The rites, and customs of the Siouan Indians were necessarily influenced by contact with other tribes during their wanderings; but the eastern,

southern and western tribes seem to have been under the influence of certain religious cults which were fundamentally the same. These religious ideas were important factors in organizing the tribal structure. The Indian religions, like those of the Eastern Continent, seem to start from the utterance of a seer; and it is this idea which always forms the vital spark of the religion, no matter how much it is encrusted in superstitions and ceremonies. Belief in animism is common among the Indians, as well as its accompanying belief in the continuity of life in the hereafter. The mysterious power to which the Indian addressed his prayers was called in the Omaha and Ponka tribes, *Wa-kaz-da*, meaning to bring to pass. The Indian believed that this power pervades all nature, animate and inanimate, and therefore to him "all things became anthropomorphized." An old Indian once said to Miss Fletcher, "The tree is like a human being, for it has life and grows, so we pray to it and put our offerings on it, that the mysterious power may help us." To the rock he prayed for long life. He believed also that after a period of privation, fasting and prayer, a manifestation of this mysterious power would come to him in a vision. The form of this vision was ever after the totem of his clan, for men having similar visions affiliated into societies or gentes. This was an important step in social development. The Thunder gentes, from the nature of the manifestation, were always the most authoritative; thunder itself being the god of war. In the Omaha tribe the Sacred Tent of War was set aside for the ceremonies connected with Thunder; and in this tent among other things was the cedar pole, called *Wa-ghdhe-ghe*, meaning the power to bestow honours. The abode of the Thunder Birds was supposed to be in the cedar tree. The honours bestowed were those for bravery in war. The next important step in the social progress of these tribes is marked by the Omaha ceremony of the *He-di-wa-chi*, "one of the simplest and probably oldest ceremonies to draw the people together and unite them into an organized body." In this too the tree was the sacred object,—the pole about which the people danced,—the recognized symbol of the all-powerful Thunder, which in turn was the manifestation of the mysterious power, *Wa-kaz-da*. Later, when the Omaha ceremony of the Sacred Pole was established, the name, *Wa-ghdhe-ghe*, which had been given to the cedar pole in the Tent of War, was applied to the Sacred Pole; but the honours bestowed were those won in peace; for, according to the legend, "The ceremonies of the Sacred Pole were devised to hold the people together."

In the Section of Geology and Geography a special meeting was held to commemorate the sixtieth anniversary of Professor James Hall's connection with the Geological Survey of the State of New York, and to take public recognition of his long-continued and valuable scientific work. The venerable and distinguished scientist, who is one of the founders of the Association, was present at the meeting and responded to the addresses made in his honour.

A paper which excited general interest was that read by Rev. Horace C. Hovey of Newburyport, Mass., on "The Making of Mammoth Cave," embodying some of the results of his recent explorations in Kentucky. Mr. Hovey has had thirty years' experience in cave exploration, and he described in glowing words the beauties and dangers of such experience. With the coöperation of Dr. R. E. Call, he has reexplored nearly all of the 200 avenues, rooms, pits and domes of Mammoth Cave. The depth of these pits has been so much exaggerated that Mr. Hovey's party undertook the dangerous and difficult task of sounding them to obtain accurate measurements. The so-called Bottomless Pit was found to be 105 feet in depth. The whole region of about 8,000 square miles, in the midst of which Mammoth Cave and many other similar caverns are found, owes its present form, he said, to simple erosion. The great size of the cave is due to the fact that it comprises many caves and grottoes whose walls have been worn away, and also to the absence of natural causes that usually destroy underground passages. The layer of sandstone overlying the limestone from which the cave is excavated is the cause of the scarcity of stalagmites. The pits and domes play an important part in forming the cave; and it has been considered by eminent authorities that they were made by the action of whirling water and pebbles from above downward. Mr. Hovey gave good evidence that they were caused by solution through the agency of acidulated water. The subterranean rivers, although easily navigable in summer, are combined in winter into a mighty rushing current, which is a powerful agent in hollowing out the long horizontal passage ways and undermining the arches, thus making the successive galleries for which the cave is noted. Mr. Hovey's conclusions are that none of the ordinary causes of cave-making, such as whirling water and pebbles, have had much to do with the making of Mammoth Cave; he believes that it has been made almost entirely by the chemical and mechanical action of water.

Mr. Hovey read another paper on the newly-discovered cave, not far from the Mammoth Cave, called the "Colossal Cavern."

This remarkable cave was discovered by Mr. Pike Chapman in 1895. It is of great size, and is supposed to be connected in a circuitous way with Mammoth Cave. It is attracting much attention, but has been as yet only partially explored.

As in previous meetings at Buffalo, the subject of Niagara Falls naturally claimed much time and attention. Many papers bearing upon the various aspects of the subject were represented in Section E. Mr. G. K. Gilbert, of the United States Geological Survey, gave three papers, as follows: "The Algonquin River," "The Whirlpool, Saint David's Channel," and "Profile of the bed of the Niagara in its Gorge."

One of the public lectures given by the Association to the citizens of Buffalo was on "Niagara as a Time Piece," by Dr. J. W. Spencer, of Washington, D. C. The age of Niagara has been estimated for the past 100 years by dividing the length of the gorge by the supposed rate of recession. In early times this was chiefly by guess, but we now have correct measurements of the modern rate of recession obtained by comparison of surveys of the Cataract. These show that Horseshoe Falls has a mean annual recession of a little more than four feet. Many other factors must enter into a calculation of the age of the Falls, among which is the fact that the recession in the past was from natural causes slower than in the present. Taking everything into consideration, Dr. Spencer considers Niagara as the best chronometer, although imperfect, of geologic time. It is also of great interest in connection with the glacial period and the antiquity of man.

This lecture, together with the papers in Section E, served as excellent preparation for the enjoyment of the day's excursion to Niagara Falls and Gorge, which was planned by the local committee for the benefit of the Association.

Dr. D. G. Brinton presented in Section H the following resolution: "Whereas, the influence which the environment of the New World has exerted upon the physical and mental development of the white race is a question of the utmost scientific and practical importance; and whereas, there appears to be no governmental or scientific bureau which is giving this subject attention at the present time; therefore, Resolved, That the A. A. A. S. appoint a committee to organize an ethnographical investigation of the white race in the United States with special reference to the causes exerted upon it by its new surroundings; said committee to report annually to the Association." The resolution was adopted by the Association, and the following committee was appointed: D. G.

Brinton, J. McKean Cattell, W. W. Newell, W. J. McGee and Franz Boas.

Professor F. W. Putnam gave a talk in Section H on the Recent Explorations in Honduras by the Peabody Museum. For the past five years explorations have been carried on at the Ruins of Copan, and the Museum has the exclusive right to continue these explorations for five years to come. The first attempt at extensive excavations on the sites of the ancient cities of Central America and Yucatan was made by the expeditions from this Museum. Although the huge stone monuments and sculptures, described by Stephens and later by Maudslay, are undoubtedly very old, explorations beneath the surface have brought to light evidence of far greater antiquity.

Professor G. Frederick Wright, of Oberlin, Ohio, presented "Fresh Geological Evidence of Glacial Man at Trenton, New Jersey." This evidence was based on the explorations of Mr. Ernest Volk, now carried on under the direction of Professor Putnam for the American Museum of Natural History. At a place called Lalor's Field, in the presence of Professor Wright, a trench was dug in order to show the several strata. In the top layer of black soil, about one foot in thickness, were potsherds, broken and perfect implements of chert, jasper, quartz, quartzite and argillite. The stratum below the black soil is composed of yellow glacial sand, varying from one to three feet in thickness. In this glacial sand, chips and broken argillite implements were found, and a few fire-split quartzite pebbles. Below this stratum is one of yellowish white sand, six inches thick, resting on the red clay. The important conclusion to be drawn from this and other similar excavations is the fact that in the *glacial* sand deposit only argillite implements are found, while in the soil above are all the objects characteristic of the later or "Indian" occupation. This early use of argillite by the people of glacial, and probably of pre-glacial time, has received many confirmations since first pointed out by Dr. Abbott; and the evidence now presented by Mr. Volk's most recent exploration is of special interest and importance in connection with Glacial Man.

Professor Putnam supplemented this paper with remarks corroborating the above statements and exhibiting a small collection which was taken from another trench in the same region.

Professor E. W. Claypole, of Akron, Ohio, read a paper on "Human Relics in the Drift of Ohio." His conclusion is that the finding of several implements in the drift of Ohio during the past

few years strengthens the belief in the co-existence of man with the ice sheet in north central Ohio.

Mr. E. O. Hovey, of New York, read a paper on the Artesian well sunk at Key West, Florida, in 1895. In boring to a depth of 2,000 feet it was found that the upper layer of 50 feet was of limestone formed of coral *in situ*, but below that the limestone was of sedimentary origin, chiefly beach sand. This is evidence in favor of the theory that the Florida peninsula is not composed mainly of natural coral formation.

Mr. J. E. Todd spoke of the "Hydraulic Gradient of the Main Artesian Basin of the Northwest." The largest known artesian area is that which extends from Nebraska and Dakota to the Rocky Mountains and about a thousand miles north and south. The water is contained in the clayey layers of the Dakota sandstone overlaid by impervious clays and shales. The pressure of the water increases with the depth of the layer; it is also greater toward the western part of the area. The variation of pressure at the same level is due to leakage. The pressure is sometimes 200 pounds to the square inch, and at Huron, South Dakota, the water rises 400 feet above the surface.

In consideration of the fact that the British Association for the Advancement of Science will hold its meeting of 1897 in Toronto, beginning on August 18, the American Association has decided to accept the invitation of the City of Detroit and to begin its meeting on August 9. This time and place will enable the members of each association to attend the meetings of the other. A cordial invitation has been extended to the members of the British Association to become the guests of the American Association, and a most courteous invitation has been received by the American Association from the Toronto Committee to join in the meeting at Toronto.

The President-elect for 1897 is Dr. Wolcott Gibbs, Professor Emeritus of Harvard University. In 1898 the Association will celebrate its fiftieth anniversary. At the Buffalo meeting much interest was shown in this anniversary meeting, which will be one of the great scientific events of the century in America.